

REMARKS

Claims 1 and 5 have been amended. Claims 6-19 have been cancelled. Claims 1-5 are currently pending in the application.

In claim 1, the added text “substantially saturated” has basis in paragraphs 0007 and 0017 of the specification. This additional description has been inserted to more clearly state the claimed polymer substance. Prior to amendment the description in paragraph 0016 beginning “By norbornene based polymers is intended...” directed the reader to this interpretation; the amendment makes this explicit.

The other amendments correct typographical errors wherein the basis is clear from the context. No new matter has been added by the amendments. Reconsideration is respectfully requested.

Election/Restrictions

Election to prosecute the invention of group I, claims 1-5 is hereby affirmed. Claims 6-19 of groups 2 and 3 have been canceled without prejudice.

Claim Objection

The Examiner objected to claim 1 for the typographical error in which the word “norbornene” was misspelled. This error has been corrected. Accordingly, Applicants respectfully request that the objection be withdrawn.

Rejections Under 35 U.S.C. 102

The Examiner rejected claims 1-5 under 35 U.S.C. 102(e) as being anticipated by Tan et al (US 2002/0029968 A1). The Examiner states that the elements of the Applicants’ invention are disclosed by Tan, including and in particular a microchannel having a neutral norbornene based polymer surface.

Applicants respectfully disagree. Dr. Hillary S. Lackritz, an inventor in the present application, sets forth facts in a Declaration pursuant to 37 C.F.R. §1.131 (see attached) that show the invention of using polynorbornene based polymers for microfluidic devices was conceived by Applicants prior to the priority date of Tan and was diligently pursued until filing the parent application of the present application.

In view of the above, Applicants respectfully request that Tan be removed as a reference, and that the above rejection be withdrawn.

Rejections Under 35 U.S.C. 103

The Examiner rejected claims 1-5 under 35 U.S.C. 103(a) as being obvious over Ramsey (U.S. patent 6,010,608) in view of either Bjornson et al (US 2002/0092767) or Tan. The Examiner argues as follows: Ramsey discloses a method for separating a mixture of ions in a sample employing a microfluidic device and two electrodes for creating an electric field in said microchannel. This method comprises introducing a sample into a microchannel comprising an aqueous dispersion of a sieving polymer whereby ions migrate in the dispersion and separate into fractions. However, Ramsey does not identify the use of a norbornene based polymer for a surface of the microfluidic device. Bjornson discloses in an alternate device that a norbornene based polymer is a suitable polymer that provides various benefits. Tan teaches that norbornene polymers provide low fluorescence emission and thereby improve the detection. One of ordinary skill would combine the teachings of Bjornson or Tan with the apparatus of Ramsey.

Applicants respectfully disagree regarding the assertion of either Bjornson or Tan as a prior art reference. Applicants submit that the enclosed Declaration under 37 C.F.R. 1.131 by Dr. Lackritz shows that the present invention was conceived prior to the effective date of both of these references and was diligently pursued until the filing of provisional application Ser No. 60/220,059, the parent of the present application. With regard to Bjornson, Applicants note that the disclosure of polynorbornene is first made in the continuation application Ser. No. 09/557,519 filed April 25, 2000. The parent of this continuation application (Ser. No. 09/153,814, filed September 15, 1998) and its parent application (provisional application Ser. No. 60/059,333, filed September 19, 1997) lack any mention of polynorbornene or polynorbornene based polymers. Thus, for both Bjornson and Tan, the effective date for the disclosure of polynorbornenes used for microfluidic devices is April 25, 2000, and May 1, 2000, respectively, and is therefore subsequent to the Applicants' date of conception as stated in the Declaration.

Furthermore, even if the effective date of Applicants' invention were not prior to Bjornson, there is a fundamental difference between the polymers disclosed by Bjornson and those of Applicants' invention such that no motivation can be found in Bjornson for the compositions of Applicants' invention. First, in Bjornson, as one example of several plastics that may be used, polynorbornene is disclosed in three instances. Notwithstanding the fact that polynorbornene, like the other polymeric or plastic materials exemplified, may impart the various qualities desired in the devices of Bjornson, polynorbornene is not the polymer material disclosed or claimed in Applicants' invention. Polynorbornene is a well-known thermoplastic polymer that has found

many industrial uses (see attached article “Polyalkenamers”, particularly p. 301-306, from the Encyclopedia of Polymer Science and Engineering, 2nd Ed., Wiley & Sons, 1988). A method of synthesis of polynorbornene was the subject of U.S. patent no. 3,676,390.

In the Applicants’ invention, on the other hand, “substantially saturated neutral poly(norbornene)” (paragraph 0007), a polymeric material not disclosed by Bjornson, is the claimed subject matter. The “neutral norbornene based polymer” of claim 1 is clarified in the specification, paragraph 0016, as:

“By norbornene based polymers is intended that the polymer comprise at least about 10 mole % of a norbornene monomer, particularly where the polymer is formed by polymerization using ring opening metathesis polymerization (ROMP), followed by hydrogenation to reduce available unsaturation.”

Thus, Bjornson’s teachings do not disclose the polymer or plastic that form the basis of the Applicants’ invention.

In view of the above, Applicants submit that their invention would not be obvious to one of ordinary skill over the disclosure of Ramsey, in view of Bjornson et al. Furthermore, with Bjornson et al and Tan et al removed as a reference as argued above, Applicants submit that a rejection based on the disclosure of Ramsey, in view of either Bjornson or Tan is now unsupported. Accordingly, Applicants respectfully request that the above rejection be withdrawn.

The Examiner rejected claims 1-5 under 35 U.S.C. 103(a) as being obvious over Ramsey (U.S. patent 4,331,590) in view of Buchmeiser (WO 98/27423). The Examiner argues as follows: Ramsey is again applied as described above. Buchmeiser (WO ‘423) teaches the use of polynorbornene for structures for carrying out electrophoretic separations, which allows one to favorably alter the properties of the electrophoretic channels.

Applicants respectfully disagree with the Examiner’s analysis. WO ‘423 teaches away from Applicant’s invention because the primary use suggested for the polymers in the reference is as a ‘stationary phase’ (p. 5) in chromatography. It also emphasizes that use is primarily determined by the size of the support particle (p. 5). The uses listed are, for example, HPLC, HPIC, chiral chromatography and electrochromatography for micron-sized particles. Sub-micron support particles may be used in capillaries, and larger support particles are appropriate for preparative scale separations, for applications such as chiral chromatography or solid-phase extraction. The phrase ‘Kapillarelektrophorese’ appears on p. 5 in relation to the use of submicron

particles, but there seems to be nothing more in the disclosure beyond this word. Applicant submits that one of ordinary skill in the art would not be led to Applicant's invention based on such a disclosure.

The described use of norbornene in WO '423 apparently does not extend beyond the use as a "stationary phase", which is an integral part of the chromatographic separation mechanism. In various chromatographic techniques, solutes move in a mobile phase subject to interaction with a stationary phase, wherein the movement of different solutes is differentially affected by their interaction with the stationary phase. As a result of these differential interactions solutes come to be separated from one another in the mobile phase. At most, WO '423 teaches that a norbornene polymer coating is useful for interacting with solutes to effect separation. This teaches away from Applicant's invention, where the norbornene based polymer substrate is used for its ability to suppress electroosmotic flow, which comes about because of the *non-interaction* of ions with the polymer.

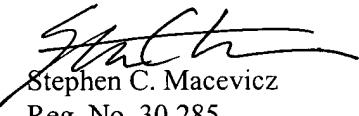
Third, the polymers disclosed in WO '423 are the direct reaction product of a ring-opening metathesis polymerizatin (ROMP) reaction (examples 1-4), and thus in the 'polynorbornene' polymers taught by WO '423, an olefin group links each monomer unit in the polymer. In contrast, the subject application makes use of "substantially saturated neutral poly(norbornene) homo- and co-polymers" (paragraph 0007). The application describes that where the polymer is formed by ROMP, the ROMP reaction is "followed by hydrogenation to reduce available unsaturation" (paragraph 0016), and "after polymerization, the double bonds of the main polymer chains and the substituents are substantially saturated through hydrogenation (paragraph 0017). For comparison of the structures showing respectively the unsaturated and saturated polymer backbones, please refer to molecular formulas shown in claims 2 and 3 of WO '423, and that shown following paragraph 0018 of the application. The compositions taught by WO '423 are not the the claimed compositions of the subject application, thus the Applicants submit that WO '423 provides no motivation for the use of the claimed compositions in the subject application.

For the above reasons, Applicants submit that rejection over Ramsey, in view of Buchmeiser (WO '423) is inappropriate and respectfully request that it be withdrawn.

In view of the above, Applicants respectfully request that the rejections thereunder be withdrawn and that the claims be allowed and the application quickly passed to issue.

If any additional time extensions are required, such time extensions are hereby requested.
If any additional fees not submitted with this response are required, please take such fees from
deposit account **50-2266**.

Respectfully submitted,



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Enclosures:

Petition for Time Extension
Declaration under 37 C.F.R. 1.131 by Dr. H. S. Lackritz
Supplemental Information Disclosure Statement with copies of cited references.